Managing a Small - scale

A Teaching Manual

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Managing a Small-scale Plantation

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Contents

Preface

Agriculture is gradually taking a new turn in many developing countries. More and more traditional farmers are engaging in semi-commercial ventures. So, farmers need to improve their knowledge of farm management techniques. Farm management deals with decision making and problems at the farm level, regardless of size or type of farm. Both small-scale and plantation farmers require a basic understanding of farm management to undertake viable farm ventures.

Managing a Small-scale Plantation is a teaching manual aimed at showing important, basic concepts of farm management for the smallholder, in traditional and commercial farming conditions. It can also serve as an elementary introductory teaching manual for students of agriculture, and extension officers.

The manual is devoted to basic concepts of farm management as a tool for decision making, record keeping, farm enterprises analyses, simple farm accounting, and budgeting. Unlike most traditional text books, this manual is written in simple English, involving simple mathematical procedures, examples and layout. With this in mind, the authors hope that farmers from all walks of life, extension officers, and students learn and apply the basic principles of farm management, to whatever they do.

The originality of our presentation is derived from our diverse ideas, background and experience in the South Pacific Region. However, we acknowledge the ideas of friends, participants and students who were instrumental in shaping our original ideas. We are also indebted to the Government of Vanuatu, who, through the Department of Agriculture and the University of the South Pacific (USP) Centre in Vanuatu, provided the venue for the first regional workshop on this subject.

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Module I: The Scope of Farm Management

Objective:

To introduce various concepts of farm management.

The Scope of Farm Management

Economics is the study of the allocation of scarce resources among unlimited wants and needs. It is concerned with how best and what efficent way to allocate limited resources to various alternative uses. The Farm is a Production subsystem in an economy, and normally identified as a business venture. Resources are actually inputs (also known as factors of production), which combine to give yield or outputs such as crop and livestock products.

Illustration 1: Farm resources are land labour, capital [i.e., farm tools, equipments, chemicals (eg fertilizers, herbicides), financial inputs (eg loans, cash money cash gifts/remittances)], management (ie skill to manage), and technology (eg new varieties, an innovation or idea).

The problem of limited resources (or resource scarcity) is the central issue in any economic analysis. This is because, the ability of any society to produce depends on the availability of resourses. Since resources are limited (or scarce) in all societies, available resources must be allocated in the most efficient way. Efficient allocation of resources means that the society/producer must organise available resources and determine their priority uses in the best way possible.

Illustration 2: Mr Siaosi Moala is a small farmer who owns 2 hectares of land, two bushknives, one planting stick. He *can* produce taro, bananas, coconut, vanilla, vegetables and rare pigs and poultry. Since Mr Moala has limited resources (land, labour, capital) he must decide on the most important enterprise (crops or livestocks) to produce so as to use the resources in the best way possible.

The ability of a society or a producer to organise and allocate resources efficiently depends on their management capacity. So, Management is concerned with decision making. Like in any business venture, the farmer is the manager of a farm business and he decides how best to use his limited resources.

Applying economic principles in the art of managing a farm business is known as farm management. This is the ability of a farmer (farm operator) or (manager) to organise resources and manipulate them to his advantage so as to control and determine the relationship between inputs and output wheii the exact conditions of the farm production environment is not fully known.

Illustration 3: The exact and full knowledge about a farm situation is not always possible. However the farmer must make decisions, even if it may turn out to be wrong. The art of management involves ▼▼ ising (or reducing) the possibility of getting the wrong results by using past information, experiences, getting advise from experts or extension advisors etc. A good manager is flexible and responsive to changes in order to avoid getting wrong results.

The basic principle in farm management is selecting the best alternative(s) among several alternatives which will yield the best results and the desired goal. For a farm operator, selecting the best alternative depends on the decision he makes when faced with the questions of:

i) What to produce?
ii) How much to produce?
iii) What method of production to adopt?
iv) How *to* get rid of the produce (he will produce?)

These are management decision making questions which a manager must always try to answer whenever he is faced with operational problems on the farm.

The question of "what to produce?"

A farm operator must choose among several enterprises. What kind of enterprise(s) to produce depending on his resource availability. The simple farm amanagement approach to such a decision is based on an economic principle known as the "opportunity cost". This is defined as the benefit for gone as a result of choosing one alternative relative to another.

Illustration 4: Mr Sitiveni Mataika wishes to produce taro, bananas, ginger, kava and local vegetables. But he has only one hectare of land. He decided to grow taro because it gives him a high income and his family requires it for home consumption, but ginger would give him higher income than taro or any other enterprises. If taro return is F$3500 per hectare compared to F$4800 per hectare from ginger. Mr Mataika, by choosing taro instead of ginger would for go F$4800 which would otherwise accrue to him, if he had produced ginger instead of taro. Therefore the opportunity cost of growing each hectare of taro is F$4800 (which is much higher than the actual income from taro of F$3500/hectare). This would not be an economically wise decision but a rational one (Explain).

In attempting to decide on what *to* produce, the farmer-manager should list all the alternative enterprises that he would wish to produce using his limited resources. He should then compare the actual benefits that would accrue from each of them, and rank them. These benefits could be either income, higher yield, family welfare and satisfaction, and traditional beliefs and customs. All of these should be given a valua. By using income to measure benefits, in the case of Mr. Sitiveni Mataika, the list of enterprises with estimated benefits could be ranked as shown in Table 1.

Table 1. Ranking Alternatives

Enterprises (F$ / ha)	Estimated Return	Rank
Bananas	2800	5
Ginger	4800	1
Kava	4200	3
Vegetables	4500	2
Taro	3500	4

Since ginger gives a higher income benefit, the opportunity cost of producing any other enterprise other than ginger would be F$4800. So, it would be better to choose ginger to produce but because of family obligation he might have to produce taro, too.

The question of how much to produce?

Having decided on what to produce the farmer-manager must now decide on *how* much *to* produce. He must determine, before hand, the quantity of the chosen enterprise which he is capable and wish to produce. In Mr Mataika's case, he should decide on the area of land to devote to the chosen enterprise. In doing so, he must consider the amount of land, labour, and other capital inputs available to him, to enable him to produce the desired level of output. He must also decide on how to best allocate these resources for *not only* the chosen enterprise, but other commodities that the family might require.

Illustration 5: Mr Sitiveni Mataika has 3 young children, his wife and himself. They prefer to eat taro daily. They consume about 3 kgs/day (about 5 big *taros).* So their annual family consumption is 3 x 365 = 1095 kgs (1.095tons). Past records from Mr Mataika's garden show that taro yield is about 15 tonnes/ha. Since taro is not ranked as the most profitable, Mr Mataika should produce only 1.095 tons + 10% insurance excess = 1.2045 tons. This is equivalent to $\frac{1.2045}{15}$ = 0.08 hectare (0.20 acre).

Mr Mataika can now examine how much labour time and other inputs he requires to look after the taro plot. The rest of his resources *can* be devoted to other more profitable enterprises such as ginger, bava, etc. The amount of ginger he should produce now depends on the surplus resource available to Mr Mataika. The most limiting resource that decides how much of ginger is produced, is, say, land. Thus, 2.00 - 0.09 = 1.92 hectares. If the Mataika family had enough capital and labour, and could meet all their family consumption, then the family farm should devote the remaining land to ginger (ie 1.92 x yield of ginger/ha).

The question of "what method of production?"

The next major decision to be made by the farmer-manager is what method of production to use. Production systems vary from country to country. These are based on a number of factors, e.g., tradition, climate, experience, foreign influence and acquired skills. Whatever system exists, the farmer must decide on the one most suitable for him.

In the South Pacific, because of limited skills and other resources, the traditional system is well developed. So, many farmers prefer to follow their traditional practice. But this is not always so, if it is found that other systems could yield better results.

Illustrations 6: Mr Tevita Tolo is a strong believer in the "Traditional" system. He has 4 hectares of land and wants to develop it. Under the traditional system, the land is farmed for 3-5 years, and rested for at least 2-3 years. So, Mr Tolo only cultivates 2 hectares each time. He later was advised by the extension officer that he could farm all his land each year if he would adopt improved farming practices. This includes using more advanced techniques, improved varieties, crop/livestock rotations, and so on. Mr Tolo later found that he could farm all his land each year, and made more income than he used to. Tavita is now planning to lease more land to expand his farm operation.

The question of "how to get rid of the farm produce?"

This is is a simple one for purely subsistence farmers, who produce only for family use. But as we all recognise, there are no purely subsistence farmers now. Most farmers are mixed-subsistence operators (the common term is ***semi-subsistence).*** So, most farmers produce surpluses of marketable and market surplus for sale. The problem is, how to get rid of these surpluses.

The farmer should decide on what to produce and how much, bearing in mind that any surplus *can* be marketed. He must identify the market at the earliest stage and consider such factors as price, market arrangements, location, transportation to and from the market, government policies, etc. This information *can* be obtained from his records.

Illustration 7. Mr Tiraa Tama is a progressive farmer from Rarotonga. He has been growing tomatoes for home use as a part-time farmer. One night, he heard over the radio that due to a shortage of tomatoes, the price of tomatoes would probably double over the next six months. Other farmers also heard this news. Most farmers decided to expand tomato production. Suddenly, the market was flooded with tomatoes. The price went down, and most farmers were disappointed, except one: Mr Kama. He heard the announcement, but knows from his records how the market for tomatoes behaves, and decided to delay his planting and produce tomatoes during the off-season. He later found himself to be the only producer selling tomatoes, and he sold at three times the forecast price.

Module 2: Farm Records and Accounts

Objective:

To understand the importance of farm **records and become familiar** with **various records used in crop and** animal **production.**

Introduction

The farming environment is dynamic - always changing. It faces changes in technology, prices, climate and institutions. These changes affect the performance of an enterprise or enterprises in a farm.

Production performance of a farm often varies from the targeted or planned levels. Here, farmers who can guide and use agricultural resources to their best advantage outperforms others. This simply means a successful farmer will be quick to choose the profitable enterprise and will raise the enterprise with efficient allocation of resources.

In order to carryout these tasks a farmer needs the following information:

- Current and known new technological relationships in agricultural production.
- Source, Quantity and Time of inputs availability.
- Input and output prices.
- Various agricultural supportive services and institutions etc.

Only systematic and accurate farm records can ensure that this information is available.

Records are essential in any management operation. A good record keeping system will allow managers to monitor and evaluate the performance of their production systems. It will help them identify problem areas in the production plan, and to make the necessary corrective measures. Similarly, complete records are useful to the manager and technical advisors in assessing any problems, in determining factors that contribute to these problems, and in deciding what to do to control these problems.

There are several uses of farm records. The most common ones are to:

- evaluate the performance of the farm over a given period.
- aid in decision making. This includes such decisions as: What to produce, how much to produce, how to produce, to which market to produce when to produce.
- provide basic information for farm planning and budgeting.
- determine resource requirements, and examine farm resource commitments, including possibilities for credit and borrowings, credit repayments, etc.
- help review, from time to time, the financial status ("worthiness") of the farm, and make necessary adjustments.

When designing a record keeping system, it is important to keep a few things in mind. First, records should be as simple as possible to minimise misunderstandings. Secondly, they should be kept in a accessible place. Thirdly, transferring records from one sheet to another should be kept to a minimum, while ensuring that all the information is transferred.

Types of Farm Records and Their Uses

Farm Inventory Records

The farm inventory is a list of all that a farm owns and owes on a particular date, usually at the beginning and at the end of each production year. It has not only lists of physical assets, but values of all assets, liabilities and debts.

"here are two steps in taking a farm inventory:

1. Physically count assets

It includes a complete listing of **all** physical assets, verifying weights and measurements **as** you go.

2. Value physical assets

After writing down the farm assets, liabilities and debts, it is important **to** value them. Market values (costs) *can* be used to do this.

Long lived assets, e.g., tractors and farm implements, tend to wear out with use. So, when valuing these assets, these values must be **depreciated.** (see Annex **1,** page 13)

Farm Production records

Production records are useful information on production and resources used by different enterprises. This is valuable in measuring production efficiency and preparing efficient alterations in farm plans. Farm production record includes:

- farm map
- crop production records
- livestock production records
- physical inputs records, e.g., labour, seeds, fertilizer, animal feeds, chemicals, etc.
- family consumption records (See Annex **2** and 3, pages 14-20)

Farm 'Financial Records

Financial records refer to farm fmancial accounts. these give information for cash analysis, and **so** infers the fmancial status of the farm. These records include capital accounts, farm operation accounts, service accounts, external accounts, and so on.

Record keeping for financial accounts follows various systems. The common ones are
- single entry
- double entry

Types of Information for Farmers

Farm Accounting Information

Potentially, **a** complete system of farm accounting should give the farmer much information, e.g.,:

- The current **cash** position and estimates of the future cash position;
- **The** past profitability of different crops;
- The **amounts** owed to the farmer by debtors, and by him to creditors;
- The value of the business's assets (plant, stock, land and buildings, etc.); and,
- The profitability of the whole farm, and estimates of likely future profits.

However, it is unlikely that **small** farmers would be able to operate such **an** accounting system, nor do they need to. However, we will see later that parts of this system would be useful to farmers.

Market Information

This information is concerned with the behaviour of the markets in which the farmer operates or intends to operate. The information about prices is assembled from past experience, the current state of the market, and estimates about future trends. The markets considered are those where the farmer is a seller and a buyer. Interest rates are included, since these are the price of money, and most farmers borrow money.

In many cases, farmers already have a good knowledge of markets in which they operate, although it is unlikely that they analyse them explicity.

Non-Routine Information

This information is important in that it is assembled for a particular decision at one point in time, and may never be needed again: for example, when you consider building an irrigation scheme. The various costs and benefits of this scheme must be assembled to decide "yes" or "no". If the scheme is accepted, then it is unlikely that this information will be needed again in the near future.

Many farmers would probably welcome advice on how to assemble this information.

Physical Information

This is likely to be information on the place and condition of the farm assets, and their use.

Discussion

Briefly discuss and consider the information they would require for making the decisions the farmer has to take (i.e. investment, consumption, financing, custodial decisions). Ask them to divide the information into the four sources discussed above (i.e. accounting, market, non-routine and physical information). Note the answers on the chalkboard/OHP.

The answers should be similar to the following:

1. *Investment* Decisions
   - Past profitability (accounting).
   - Likely future costs and revenues (market).
   - New equipment to be bought (non-routine).
   - The condition, location and present use of assets needed for this investment (physical).

2. Consumption Decisions
   - Farm Family per capita consumption of various commodities
   - Profitability of farm (accounting), plus knowledge of proposed investment plans (above) relative to farm household consumption needs.

3. Financing Decisions
   - Present and future cash position (accounting).
   - Alternative external finance available (market).

4. Security Decisions
   - Location and condition of assets (physical)
   - Details of debtors and creditors (accounting)
   - Ownership and legal protection (legal).

Conclusion

Farmers have to continually make management decisions, as we have so far identified. These management decisions determine the outcome of a farm operation in relation to investments undertaken, financing of the operation, protection, or custodial and consumption behaviour of the farm household.

Thus, to make good decisions, farmers must have relevant information as we try to identify and use this information to improve their farm operation.

Annex 1:

Depreciation

Depreciation means spreading the original cost of an asset over its entire useful life. This is done because long-lived assets have wear and tear. Therefore, the value of these assets change over time.

There are various methods of calculating depreciation values, but the ***straight-line*** method is the simplest:

Straight-line method

Annual depreciation (AD) of an asset is computed by dividing the original value (OV) minus the salvage value (SV) by the expected years of life of the asset (EL).

$$AD = \frac{OV - SV}{EL}$$

Annex 2:

Crop Production Records

Table 1. Crop Inventory

Type of product	Quantity (Tonnes)	Number	Value on 1 June 1989 ($)
Taro			
Copra			
Cocoa			
Maize			
Yams			
Vegetables (Specify)			
Others			
Totals:			

Table 2. Farm Machinery Inventory

Machinery	Description	No.	Year of purchase	Original cost ($)	Value on 1 June 1989 ($)
Tractors					
Ploughs					
Harrow cultivators					
Seed drills					
Sprayers					
Trailors					
Trucks					
Motors					
Pumps					
Chaffing machines					
Totals:					

Table **3.** Farm Building Inventory

Description	No.	Type	Value on 1 June 1989 ($)
Store			
Machinery shed			
Miscellaneous building			
Total:			

Table **4.** Crop Cultivation Record

Crop ..... Variety ..... Season .....Year .....
(Irrigated/Unirrigated)

Operational costs:

Particular (and no.)	Time	Labour			Bull Power				Tractor / Mechanical Power			
		Family or permanent	Hired	wage	Owned	Hired no.	Hired hours	Hired rate	Owned	Hired no.	Hired hours	Hired rate
Ploughing												
1.												
2.												
3.												
4.												
Harrowing												
1.												
2.												
3.												
Planking												
Sowing												
Manuring												
Fertilizer application												
Transplanting												
Irrigation												
1.												
2.												
3.												
4.												
5.												
Weeding												
Spraying/dusting												
Harvesting												
Threshing												
Winnowing												
Transport from farm to home												
Other costs												
Totals:												

Material Costs:

Item:	Rate Applied	Value	Area covered	Place of purchase
1. Seed/Seedling				
2. Manure				
3. Fertilizers:				
1.				
2.				
3.				
4.				
4. Irrigation charges				
5. Chemicals				
1.				
2.				

Table 5. Daily Labour Sheet

Name of Crop	Plot	Type of work	Manual Labour		Bull power	Tractor power	Other machine	Remarks
			Male	Female				

Table 6. Comparative inventory of farm produce

Produce	On June 1, 1987 Quantity/ No.	Value	On June 1, 1988 Quantity/ No.	Value
Taro				
Coconut				
Cassavat				
Yams				
Vegetables				
Total:				

Table 7. Record of Farm Produce Consumed on the Farm

Type of farm produce	Quantities consumed				Balance Sold
	By family	In seed	Paid in kind	Livestock feed	
Taro					
Copra/coconut					
Yams					
Cassava					
Vegetables					

Annex 3:

Animal Production Records

The information presented in this section may be too detailed for use by all types of farmers in the various country. However, it is still useful information particularly for medium and large scale farmers as well as extension workers and scholars of agriculture. Remember, it is very difficult to offer sensible advice to a farmer if records are missing or are incomplete. every farmer must therefore attempt to keep records on his farm operation.

Animal Production Records

Production records for animals are of value in culling non-productive breeding stock from the herd and in the selection of replacement breeding animals. Indeed, they are the starting point for overall herd records. Individual records are usually kept on boars and sows/gilts.

1. Sow/Gilt Records:

   Identification
   - number and breed
   - breeding background from where the animal was bought

   Reproduction record
   - Breeding records
     - Heat periods and dates
     - dates of services indicated as first or repeat services
   - Farrowing records
     - expected farrowing dates
     - actual farrowing dates
     - average weight of piglet at birth
     - abnormalities in the litter
   - Weaning records
     - weaning date
     - number of pigs weaned
     - average weight of pigs at weaning time

   Litter management record
   - dates of routine management procedures e.g. identification, weighing clipping off milk teeth, iron injection, creep feeding, tail cutting, castration, weaning and mortality records.

   Health record
   - health problems experienced
   - treatments used
   - success and failure of treatments
   - death losses and dates of losses

   Culling
   - date and reasons for culling

2. Boar

   Identification
   - Similar type of information as on sow

Production record
- weight at birth, three and eight weeks of age
- litter size he came from
- age at 90 kg liveweight

Reproduction records
- age and weight at first mating
- dates and numbers of sows served
- litter size and weight at farrowing and weaning

Health records
- as indicated for sow

Culling

The importance of these various sow and boar records are explained under the sections dealing with the management of these animals.

Herd records

A herd record sheet summarises important aspects of herd production each month. The manager can compare these records, which measure production efficiency, with previous figures. They can also be compared with production goals that are set for the enterprise. These records indicate where changes are occuring in the herd performance, and what could be done in problem areas.

So, for example, death losses in a farrowing house may change from 15% of the pigs born alive to 20%. Such a change should prompt the manager to look into the reasons for the increased losses, and then take proper steps to fix the situation.

Herd records should include:

Reproduction records
- females served with indications whether they are first service or return on heat breeders.
- how many sows farrowed
- total number of pigs born alive and dead
- how many pigs are weaned
- average weaning weight of pigs

Death loss records
- death losses by category e.g. piglets, weaners, growers, finishers and breeding animals.
- causes of death losses

Additional inventory
- number of pigs brought in from outside and the reasons for bringing in new pigs.
- where and when pigs were obtained from

Feed consumption
- data on total feed consumption and possibly with a breakdown for each pig feed category i.e. Creep feed, weaner feed, grower feed, finisher feed, breeder fee; or for each group of pigs; piglets, weaners, growers, finishers, boars and sows.

Market information
- how many pigs were marketed
- age at marketing time
- marketing weight
- carcass grade for slaughtered pigs
- carcass value i.e. gross revenue

From the above information many useful inferences can be drawn. These include:
- conception rates
- average litter size and weight at birth
- stillbirth incidence in the herd
- average litter size and weight at weaning time
- percentage death loss in any pig category
- feed consumption and feed utilisation data for the herd as well as for each individual pig category
- marketing age and
- carcass value

These indicators tell the farmer how well or badly the production programme is going.

Module 3: Enterprise Analysis

Objective:

To draw information about the performance of an enterprise using farm records.

Introduction

The success of any farm depends on how profitable each farm enterprise is. So, the profitability of each enterprise needs to be analysed to evaluate the farm operation's financial performance. It is possible to check this perorfmance with a set of historical data on the farm enterprises. The objective of this analysis is to examine viability and profitability of each enterprise.

Discussion **1.**

An enterprise refers to any business undertaking. However, in farming, enterprise is a type of production (such as crops, livestock, etc.) which has distinctly different activities. So, each crop grown on the farm can be defined as an enterprise: for example, taro enterprise, coconut enterprise, cocoa enterprise, yam enterprise, and banana enterprise. This can also be said for each type of livestock reared on the farm: e.g., broiler enterprise, egg enterprise, pig enterprise, beef enterprise, dairy enterprise, sheep enterprise, and goat enterprise. The group of activities related to an enterprise is called theproduction system of that enterprise. An activity of the production system is commonly called a husbandry practice.

An activity is a production treatment or husbandry practice which must be (sequentially) undertaken if the enterprise is produce. These include; land preparation, planting, fertilizing, weeding, pest and disease control, harvesting, and marketing.

When a decision has been made on the type of enterprise to produce, it is important that a careful examination of the various activities involved in the production of that enterprise are made.

Gross Margin (GM)

Grass Margin (GM) is one of the most commonly used financial indicators in farm management. It is used to analyse and appraise the performance of each enterprise in a farm. Normally, a farm with multiple enterprise data on all fixed inputs used in each enterprise is difficult to find, or may not be available. *So,* calculating profits to compare is not possible, because it requires information on fixed costs. Gross margin is defined as gross return *(GR)* minus total variable *cost (VC).*

GM = GR - VC

So, GM is very useful in comparing enterprise performance in a multi-enterprise farm. Gross margin is gross return after all variable cost have been accounted for, which means it is return on variable costs only, and does not include fixed costs. This means sequential analysis of various activities, so that all input requirements and *costs* incurred are determined. It requires complete farm records of various activities involved in the production of each enterprise.

Essentially, gross margins are used to measure the efficiency of an enterprise production per unit area or head. When gross margins are calculated for a given season (or year), it can also be compared with previous season(s). The results form the basis for future alterations in the existing farm plan.

The procedure for gross margin analysis can conveniently be divided into a series of steps.

Step *1.* Determine the enterprises on the farm for which gross margin calculations should be made. Ideally, any enterprise produced on the farm for sale should be included. Define each enterprise output and input requirements on per unit area (hectares or acres).

Step *2.* Check all available records for accuracy, consistency and completeness. Ensure that complete records on each enterprise, activity and production system are available.

Step 3. State all appropriate assumptions for each enterprise, defining all conditions in which each enterprise is produced, consumed and marketed. These assumptions should include production systems, input prices, seasonal changes, market prices, yields, and systems of measures.

Illustration 1.
Assumptions must be stated, preferably at the top of the GM Table. For example:

"1. Small holder mixed subsistence farming sytems selling all surpluses.
"2. Intercropping Practice
"3. No Mechnization, but using weedicides, fertilizers
"4. Price per ton - $250
"5. Yield: 14 tons/hectare".

Step 4. Determine iteratively all the labour input requirements for every activity under the given production system. Define the labour inputs per unit area in terms of "man-hours" or "man-days". Where farm activities are undertaken at different hours of the day totaling less than 8 hours per day it is better to use man-hours. But where the system follows a strict 8-hour working day, man-days may be used.

Illustration 2.
Each activity needs labour inputs. These can be defined in man hours or man days per activity. The amount of labour inputs will be the basis for Gross Margin Analysis.

"1. Land Preparation .....32 man-hours or 4 man-days.
"2. Planting.....10 man-hours or 2.25 man-days
"3. Weeding etc."

Step 5. Determine iteratively all other variable input requirements for each activity, and overall production period under the given production system. Make detailed valuation of all variable inputs to allow calculations for these activities.

Illustration 3.
Each activity also needs some level of variable inputs. These can be defined in as units per activity.

"1. Land Preparation .....2 litres of round-up
"2. Planting.....1200 taro tops (tiapula) per hectare
"3. Weeding etc."

Step 6. Determine all costs for variable inputs, including hired or contract labour but EXCLUDING **COST OF PERMANENT LABOUR** and **FIXED** INPUTS.

Illustration 4.
"1. Land preparation 2 litres of round-up at $55 @ $110.00
"2. Planting 12000 taro tops (tiapule) at $10.00/100...$12000.00
"3. Fertilizing (NPK)...500 kgs at $50/50 kg bag ... $500.00

Labour hours should not be costed against wage rate unless labour is hired or on contract.

Step 7. Determine subtotals for each activity, and grand totals for the enterprise, for labour inputs, variable inputs, input costs, etc.

Step 8. Determine the results for the gross margin:

- Based on the yields and price per unit, as stated in your assumption, and calculate the "gross return" (GR)
- Based on the variable costs per activity per unit area, add up all subtotals to obtain the total variable costs.
- Substract the total variable costs (TVC) from the gross return (GR) to obtain **GROSS MARGIN.**

So, Gross Margin / unit area = (GR- TVC)/area

Step 9. Determine the return to labour:

- Divide Gross Margin by total labour input.
- Compare this result with minimum rural wage in your country.

See Annex 3.

Using Gross Margins

Gross Margins (GM) can be used effectivelyto appraise and evaluate the performance of a farm business. But their basic simplicity bely the fact that if they are not fully understood, they can be very misleading. All GM calculations must be checked very carefully for consistency, accuracy and representativeness. Input values must be realistic, to represent the actual situation. Input costs and output prices must be based on current market prices.

A realistic gross margin analysis can be very useful. It may be used to:

1. Appraise the viability of each enterprise,
2. Evaluate the performance of a farm business operation,
3. Provide useful information for (future) planning and budgeting,
4. Help make management decisions, e.g., decisions on what to produce, and what input levels to use, are better using information from gross margin analysis, and
5. Provide information for predicting future production levels.

Gross margins are generally criticized in that they do not include fixed costs. In fact, at any planning stage, the use of gross margin allows for estimating and focusing on fixed cost (see Annex 4) by emphasizing considerations on the influence of fixed costs on farm business performance.

Critics of gross margins argue for full costing, which is time consuming, and attempt to allocate fixed costs to activities, even if the results are arbitrary (see next section for discussion). This approach has even greater dangers than in using gross margins. It contradicts the usual view that farmers have better control over fixed costs than variable costs, although fixed inputs are acquired under the discretionaryjudgement of the farmer. Most smallholder farmers have better control over their variable costs than fixed costs, so that what they should worry about is the level of gross margins in each enterprise.

Annex 3

Examples of Gross Margins

Table 1. Gross Margin for Swamp Taro (*Colocasia esculenta*)

Assumptions:
1. System of Production - Machinized System
2. Tractor hire - $18.00/hr
3. Planting Time - Anytime during the year
4. Maturity Period - 7-9 months
5. Spacing - 1 m x 1 m
6. Hired labour charges - $4.25/manhour
7. Plant Population - 10,000 plants/ha
8. Yield Per Hectares - 14 tonnes
9. Price per Tonne - $400
10. Gross Return (400 x 14) = $5600
11. Family labour is used for all operations **except** planting.

Production Activities

A. Establishment	Labour required (Manhours)	Variable Inputs Costs ($)
1. Mechanical Cultivation		
a) Ploughing (Requiring 3 tractor hours)		**54.00**
b) Harrowing (Requiring 2 tractor hours)		36.00
c) Ridging/Lining (Requiring 1.5 tractor hours)		27.00
Totals: (NB do not include tractor hrs in manhrs)		**117.00**
2. *Planting*		
a) Purchasing, transporting and preparing Planting material	10	
b) Planting (hired labour)	120	510.00
Totals:	**130**	**510.00**
B. Maintenance		
a) Weeding (5 times)	200	
b) Pest Control	60	
i) Sumicidin ..... 0.5 litres		20.00
ii) Malathion ..... 1.75 litres		**15.00**
c) Fertilizing (NPK) - 250 kgs	20	130.00
Totals:	**280**	**165.00**
C. Harvesting *and* Marketing		
a) Hand Pulling	100	
b) Cleaning and Crate Costs	70	235.00
c) Transportation (3 trips at $5/trip)		15.00
d) Selling	253	250.00
Totals:	**423**	**500.00**
GRAND TOTAL	**663**	**1042.00**

D. ***Total Gross Return*** = **14 x 400** $ **5,600**
Total Variable Cost **$ 1,175**

So, GROSS **MARGIN** PER HECTARE = $ **4425.**

E. ***Return to Labour*** = $\frac{4425}{833}$ = **$5.31 /** manhour

F. ***Wage rate / hr*** = **$1.25**

So, this is an **ACCEPTABLE RETURN**

Class Exercise

Suppose your Director requested you to determine the **gross** margin for traditional taro production in your country where Machinical cultivation is not possible. The general practice you know is traditional system but **all** produce is marketed. Given that yield under the traditional system is **low** 8 metric tons per hectare. **Using** your experience, prepare systematically and step by step, a gross margin table.

Table 2. Gross Margin **for Commercial Meat Chicken (S)/p**

Assumptions:

Loss/mortality in rearing 7.5%
Number of Chicks purchased at day old . . . . . **2800** chicks
Number of birds slaughtered at above mrtality rate . . **2590** birds
Estimated cost of shed/sq ft (incl. feeders/drinkers) . **$4.50/sq ft**
Average Live weight at slaughter age . . . . . **1.84 kg**
Average Dressed weight at slaughter age . . . . . **1.25** kg
Dressing out **68%**
Food conversion efficiency to slaughter age **2.01**
Slaughter age in weeks . . . . . **6** weeks
Feed consumption/bird of Broiler Starter . . . . . **1.20 kg**
Feed consumption/bird of Broiler Finisher . . . . . **2.50 kg**
Feed consumption/bird to slaughter age . . . . . **3.70** kg
Wholesale price/kg (dressed weight) **$3.90**
Depreciation charged on all capital **12.5%**
Interest rate charged on capital 8.0%
Interest rate charged on **7** batches of operating costs **8.0%**
Average labour cost per hour **$1.25**
Local agent markup on imported CIF feed cost **115%**
Cost of Day Old Chicken on farm **$0.95**
Price of Broiler Starter @ above markup **$0.64/kg**
Price of Broiler finisher @ above markup **$0.60/kg**
Cost of freezer storage per unit
(bird storage capacity) **$3.25/bird**
No allowance is made for cost of land due to big variation in leases.

A Capital Development

	units/unit	T$
Cost of shed including feeders & drinkers	**2590 sqft (4.50)**	**11,655.00**
Freezer for storing one batch of birds	**2590** bird **(3.25)**	**8,417.50**
Feed store **20 x 10**	**300** sqft **(9.00)**	**2,700.00**
Total		**22,772.50**

Capital cost per bird capacity = $8.76/bird
Labour Requirements for 7 batches/yr @ 8h/d for **365** days = **2,920** Manhours

B. Operating Cost per batch

Purchase of day old chicks	**2800** chx **(0.95)**	**2,660.00**
Cost of Starter imported feed	**3108** kg **(0.64)**	**2,001.55**
Cost of Finisher imported feed	**6475** kg **(0.60)**	**3,872.05**
Water cost per batch	**2.3 1** mth **(10.0)**	**23.08**
Electricity for brooder heating first	**4** wks **(0.92** mth **- 30.0)**	**27.69**
Vet services	**2590** bird **(0.01)**	**25.90**
Slaughter Fee on birds	**2590** bird **(0.15)**	**388.50**
Transport from abattoir to market	**2590** bird **(0.05)**	**129.50**
Cost of labelled plastic bag	**2590** bird **(0.05)**	**129.50**
SUBTOTAL B		**9,257.78**

Average FEED cost per bird = $ 2.27
Average FEED cost per kg = $0.60
Average cost per bird dressed = $3.57
Feed Cost as a % of Total Cost = 63.47 %

C. Gross Return per batch

units/unit	T$
2590 (3.90)	10,101.00

D. *Gross* Margin per batch (B-C) = $ 843.22

E. Gross Margin per Bird *Sold* = $ 5.33

F. Gross Margin per year
[(B-C) X No. of batches]:

Batches per year	Gross Margin
7	$ 5,902.57
6	5,059.35
5	4,216.12
4	3,372.90

G. Return to Labour (per manhour)
[(F)/2920 manhours]

Batches per year	Gross Margin
7	2.02
6	1.73
5	1.44
4	1.16

[compare with market price for labour of $1.25/hour]

H. Net Return *(Profit)*
[GM/year less Fixed Costs]
FEED COSTS = LABOUR + ESTABLISHMENT COSTS + DEPRECIATED CAPITAL COSTS + INTEREST

Depreciation on Capital p.a. [7 batches] on $ 22,773 @ 12.5%	= $ 2,846.56
Interest on capital per year on $22,773 @ 8%	= 1,776.00
Interest on operating costs [7 batches] 9258 @ 8%	= 5,184.35
Labour @1.25 x 2920 man hrs. up to here	= 3,650.00
Total Fixed Costs	**= $ 13,456.92**

- Gross Margin per year [7 batches] = $ 5,902.57
  Net Return is negative - ($7,554.34)
  Net Return per Bird Sold (before tax and insurance) is negative - ($0.42)

- Gross Margin per year [6 batches] = $ 5,059.35
  Net Return is negative - ($8,397.57)
  Net Return per Bird Sold (before tax and insurance) is negative - ($0.42)

- Gross Margin per year [5 batches] = $ 4,216.12
  Net Return is negative - ($9,240.79)
  Net Return per Bird Sold (before *tax* and insurance) is negative - ($0.71)

- Gross Margin per year [4 batches) = $ 10,064.02
  Net Return is negative
  Net Return per Bird Sold (before tax and insurance) is negative - ($0.97)

Table 3. Gross Margin for Small Scale Meat Chicken Unit (S)/p

Assumptions:

Loss in rearing	10.0%
Cost of Day old Chick	$ 0.95/chick
Age to slaughter	10 wks
Estimated cost of shed/sq ft shed incl feeders & drinkers	$2.00/sqft
Cost of Broiler Starter feed/kg CIF	$ 0.56/kg
Broiler Starter from local agent markup of 115%and $/kg	$ 0.64/kg
Cost of copra meal	$ 0.10/kg
Average Live weight	2 kg
Average Dressed weight	1.50 kg
Dressing out %	75%
Feed conversion efficiency to meat	2.01
Feed consumption while in the first 4 wks on Broiler Starter	1.20 kg
Feed consumption of coprameal from 5th wk to slaughter	4.00 kg
Feed consumption per bird to slaughter age	5.20 kg
Wholesale price/kg Dressed weight	$3.90/kg
Depreciation charged on all capital	25%
Interest on all capita	8%
Number of chicks purchased per batch	40
Number of birds slaughtered per batch	36
Number of batches slaughtered per year	4
Average labour cost per hour	$1.25/hr

Assume scavenging for 5 to 6 hours per day
Labour required (in minutes -night and morning) ..... 17 hr 10 min
Depreciation @ 25% on 100 p.a. [4 batches]
No allowance is made for cost of land due to big variation in leases.

A. Capital Development

	units	T$/unit	Total ($T)
Shed cost with feed box incl feeder & drinker	50	2.00	$100.00

▸ Capital Cost per Bird Capacity = $ 2.78

■ Labour Requirements for all batches / year = 60.83 manhours

B. Operating Costs per batch

Purchase of day old chicks	40	0.95	38.00
Purchase of Broiler Starter imported feed	115.20	0.64	74.19
Purchase of Coprameal	72	0.10	7.20
Water cost (same rate as Commercial System)		0.14	
Electricity for broader heating		0.00	0.43
Services	0.01	0.37	
Slaughter Fee on birds		0.15	6.00
Transport from abattoir to market		0.05	2.00
Cost of labelled plastic bag		0.05	2.00^R
	Subtotal		130.33
Average Feed cost per bird	$ 2.26		
Feed cost as a % of Total Cost	69.4%		
Average Feed cost per kg	$ 0.43		
Average cost pet bird dressed	$ 3.26		

C. *Gross* Return per batch

Sale of Dressed Birds @ 1.5 kg for $4.08 each = $ 220.32

D. Gross Margin per batch [C-B] = $ 220.32 - 130.33 = $ 89.99

E. Gross Margin per bird *sold* = $ 2.50

F. *Gross* Margin per year [D-C: assuming 4 batches per year] = $ 359.95

H. Return to Labour (per manhour)
[(E)/60 manhours, assuming 4 batches per year] = $ 6.00 / hour
[Compare with market price for labour of $1.25 / hour]

G. Net Return *(Profit)*
[GM/year less fixed costs]

Module 4. Farm Accounting

Objective:

To estimate effectiveness of financial control and the worthiness of the farm business.

Introduction

Making observations on the business and deriving information is one of the important roles of farm management. Farm accounting provides information to control money flow in the business. It provides information on financial "worthiness", performance and monetary checking. The common forms of accounts are the **Balance Sheet,** the **Profit and Loss Account,** and the Cash Flow Statement.

Discussion:

Profit may be calculated in two ways; by:
a) substracting total annual operating costs from the total annual income, or
b) substracting total overhead costs from the gross margin the total overhead costs.
Overhead costs are related to fixed costs which must be depreciated to give the representative annual overhead costs, **e.g.,** the depreciated value of machinery, equipments, buildings and farm tools.

Profit is regarded by many farm management specialists as a "return to management". It is therefore important to account for **all** expenses incurred during the year, including the value of unpaid family labour, to find the exact **PROFIT** value.

Balance Sheet

The balance sheet gives information on the worthiness of the farm at a given point in time. It is usually prepared at the beginning or end of the financial year.

It consists **of** two parts:

1. *Assets*
   Items which the business owns or can use to acquire more items, e.g., cash, car, tools, building, machinery and land.

2. *Liabilities*
   Claims made by others to the business, or items that are used by the business but not owned by the business, e.g. loans and credits.

Assuming that all assets are owned by the business and the total liabilities (or claims) belong to somebody else, then for a business operation to function, the assets must equal liabilities. The two conditions should balance one another, hence the term "balance sheet".

Simple Balance Sheet (at 31 December 1987):

Assets		**Liabilities**	
($)		**($)**	
Farm Truck	**5.000**	Bank Loan	**4,000**
Farm Tools	240	Net Worth'	1,790
Savings (in Bank)	**500**		
Cash (in hand)	50		
	5,790		5,790

Net worth is assets minus liabilities, and it represents the owner's claim on the business.

Class Exercise

On 31 December 1987 Mr Dovo's farm balance sheet was:

Assets	($)	Liabilities	($)
Stocks	4,000	Bank Loan	2,000
Equipment	700	Net Worth	2,900
Cash	200		
Total	**4,900**		**4,900**

On 31 December 1987, Mr Bikini counted his stock and found that it was worth $3,500. The farm still has still the same equipment. There was $400 cash in hand. His loan owed to the bank was now only $1800. Prepare a balance sheet for Mr Bikini's farm as of 31 December 1987.

Analysing Profit

Detailed farm records are needed to carry out a profit and loss account analysis. The best approach is usually to get all records kept for the major farm enterprises, and treat each enterprise individually.

Let us consider Mr Dovo's farm, where the major enterprises are taro and pigs. Examine each enterprise returns (income) and the associated costs.

The Profit and Loss Account provides information about the performance of the business in a given period of time. This is normally is one year. Profit is a return to the management. So, a manager will be interested in making judgements based on the profit earned.

The term ***profit*** has different meanings for different people. We define profit as the ***difference between gross income from the annual (farm) operation minus total costs.*** Total costs include annual operating costs (which are the total variable cost plus operating overhead costs · or fixed costs). Overhead costs include depreciated costs of fixed assets. Table 1 shows a simple example of profit and loss account.

Given that our analysis of the individual enterprise is sound, it is possible to examine the relative profitability of each enterprise. This may be done by determining the profit margins of each enterprise.

Profit Margin

Profit Margin is the percentage of gross income relstive to the net profit from a given enterprise. $0:

$$\text{Profit Margin} = \frac{\text{Net Profit}}{\text{Turn Over Sales}} \times 100$$

Table 1. Mr Dovo's Farm Profit Analysis

	Taro ($)	Pig ($)
A. Sales	10,000	12,000
B. Less Purchases		
i) Opening Stocks	3,000	100
ii) New Stocks	5,500	3,650
Totals:	8,500	3,750
C. Add Closing Stocks	2,000	250
D. Less Expenditures		
i) Wages	1,600	2,000
ii) Machine Hire	500	800
Totals:	2,100	2,800
E. Enterprise Profits: (A+C)-(B+D)	1,400	5,700
TOTAL PROFIT FROM BOTH ENTERPRISES = $ 7,100		
F. Less Other Farm Expenses		
i) Household Consumption	1,000	
ii) Motor Car expenses	500	
Total:	1,500	
So, Annual Profit (E-F) = $ 5,600		

So, calculating the profit margins for Mr Dovo's farm (from Table 1):

i) Taro Profit Margin: $\frac{1,400}{10,000} \times 100 = 14\%$

ii) Pig Profit Margin: $\frac{5,700}{12,000} \times 100 = 47.5\%$

From this information, it appears that the pig enterprise is more profitable than taro, since for every dollar of sales from taro, the farmer makes only 14 cents, compared to 49.5 cents for every dollar of sales from the pig enterprise.

Discussion:

Should the farmer jump into this decision, keep only pigs, and forget taro? Discuss what decision should now be made.

Liquidity

A business is **liquid** when it is able to pay its liabilities (debts) when they are due. This is **not** the same as the business being profitable. As seen already, it is quite possible for the net assets of a business to increase when making a profit, while, at the same time, the cash and bank balances are falling.

Discussion:

Ask participants to suggest reasons why a profitable farmer might still be unable to pay his bills. (Poor timing of cash payments and receipts.)

To a farmer, liquidity is as important as profitability, If money is not available to pay the wages and buy the inputs needed for the farm's activities, the farm will soon cease to function properly. A *liquidity crisis* usually forces the farmer to sell offstock and other assets quickly in order to raise money, and this usually means selling at a loss.

Cash Flow Budget

When drawing up a planfor the farm, the liquidity as well as -profit must be considered. This is best done using **a cash flow budget.** Where the profitability budget can be done in total for the year, the cash **flow** budget must be done monthly.

Discussion:

The following example is based on the exercise of Mr Dovo's Farm.

Example:
If we wish to draw up a cash budget for Dovo's farm, based on a given plan, we need to know more about the timing and frequencies of payments and receipts. Assume that further investigation got the following additional information:

(a) The following inputs are necessary for taro and must be paid for in cash:
- 7500 taro tops at $5.00 per 100 in April and August.
- $1,000 for fertiliser in May and September.
- Wages of $200 per month.

(b) One crop of taro will be harvested, estimated at 80 tonnes in November for. about $150 per tonne. The crops will be sold for cash during the harvest month.
(c) Rented land for the pigs will be paid in two equal instalments in June and December.
(d) Consumption and motor car expenses will be paid for evenly over the year.
(e) Mr Dovo will need to draw $300 per month for personal use.
(f) The taro tops and fertiliser unused or produced can be sold at once for cash at 10% less than their balance sheet value.

See Table 4 for the resulting cash flow budget.

Finance:

It is quite clear that although our plan is profitable Mr Dovo will need finance help for 7 out of the 12 months of 1987. *We would not see this had we simply estimated the year and cash balance.* Cash **flow** budgets must be done on a monthly or even weekly basis.

Discussion:

Ask participants to suggest how the problem might be overcome. (Supplier credit, advance payments for crop or bank overdraft). Calculate affect of various suggestions.

It is clear that Mr Dovo must either change his plan or negotiate more fmance. Where finance is negotiated, revise the cash budget to account for loan repayments.

Table **4.** Cash Flow Budget for the Dovo **Farm,** 1987.

Item:	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
(A) Balance b/f	200	1,392	784	176	(1,932)	(2,540)	(2,498)	(3,106)	536	(72)	(680)	(1,288)
Receipts												
Pig Sales												
Seed & Fert.	1,800											
Land Rent							650					650
Taro Sales										6,000		6,000
(B) Total Receipts	1,800	-					650	-		6,000	-	6,650
Payments												
Wages	200	200	200	200	200	200	200	200	200	200	200	200
Other costs	108	108	108	108	108	108	108	108	108	108	108	108
Drawings	300	300	300	300	300	300	300	300	300	300	300	300
Taro Tops				500				750				
Fertilizer				1,000				1,000				
(C) Total Payments	608	608	608	2,108	608	608	608	2,358	608	608	608	608
Balance c/f (A + B - C)	1,392	784	176	(1,932)[a]	(2,540)	(2,498)	(3,106)	536	(72)	(608)	(1,288)	4,754

[a] Figures shown in brackets are negative.

Appendices

Appendix A:

Programme

for CTA/IRETA Workshop on Managing a Small Plantation at Port Vila USP Centre on September 11 - 15, 1989

DATE	ACTIVITIES
Monday 11th Sept. 1989	
8.30-10.00	Welcome
10.30-12.30	Farm Management Concepts and their relevance to Farmers (F. Opio)
1.30-5.00	Farm Records (K. Jegasothy)
Tuesday 12th Sept. 1989	
10.30-10.00	Farm Record Excercise (K. Jegasothy) Farm Enterprise Analyses (K. Jegasothy)
XO.00-10.30	Concept of Gross Margins, Profits etc. (K. Jegasothy)
10.30-12.30	Farm Enterprise Analyses (continued) (K. Jegasothy)
1.30-3.00	Exercise on Gross Margins Calculation (K. Jegasothy)
3.30-5.00	Exercise on Cash Flows (F.Opio)
Wednesday 13th Sept. 1989	
8.30-12.30	Farm Visit
1.30-5.00	Farm Accounting (F. Opio)
Thursday 14th Sept. 1989	
8.30-12.30	Farm Accounting Exercise (F. Opio)
1.30-5.00	Farm Visit
Friday 15th Sept. 1989	
8.30-10.00	Some Experiences **of** Plantation and Smallholder Management in Vanuatu (C. Rogers)
10.30-12.30	Discussions and Suggestions
2.00-3.00	Review **of** Suggestions **and** Recommendations
3.30 p.m.	Closing Remarks by Minister **of** Agriculture

Appendix B:

List of Participants

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